

Open Innovation Strategies for Knowledge Transfer: The Italian Case of Territorial Interest Groups

Angela Sansonetti¹, Marco De Marco²

¹asansonetti@luiss.it, LUISS G. Carli, DPTEA, CERSI, Viale Pola 12, Rome

²marco.demarco@unicatt.it, Catholic University of Sacre Heart, Largo Gemelli, Milan

In the last decade, knowledge based economy (KBE) has induced a revolution of innovation processes due to the increase of collaborative research, structured partnerships and other types of cooperation among research organization and industries. In such increasingly KBE, co-operation between universities and industries plays a strategic role in the processes to design, develop and exploit innovations (European Commission, 2006). In this new context, characterised by a sort of “open innovation”, Universities and other research institutions play a strategic role to knowledge transfer and innovative results (Perkmann & Walsh, 2007). The adoption of this “open innovation” paradigm allows to “outstrip the knowledge endowment of an individual contributor” and to build the consensus “around issues such as technology standards that have permitted whole business ecosystems to flourish” (Chesbrough & Appleyard, 2007). Thus, the advantages of cooperation are increasing in the open innovation era (Enkel, Gassmann, & Chesbrough, 2009): the concepts of open, networked and interactive innovation show off the key role that the current relationships between universities and industry play in development of innovations. The sharing and transfer of knowledge, competencies and know-how in open environments, allow to design new solutions in order to manage research results, and to capitalise on tangible and intangible resources developed inside. According to the European framework, the development of more effective mechanisms and policies to promote dissemination and exploitation of research results, related to the use of publicly-funded, becomes fundamental to implement knowledge transfer and innovation processes. In this perspective, this paper focuses on the Territorial Interest Groups (GITs), promoted by Italian Ministry of University into the strategy of communication and dissemination of National Programmes on R&D co-financed by EU, as an innovative strategy to follow up the results obtained within R&D (Research and Development) co-operative projects implemented in contexts of open innovation among research organizations, university, and stakeholders - enterprises, no profit association, opinion leaders -.

1. Introduction

This work aims at analysing the open innovation processes into the university-industry link and connected with the bottom up strategy of Italian Ministry of University (MIUR) to transfer knowledge using the clusters of TIGs.

The benefits of university-industry link are evaluable in term of development of mutual trust for long-term strategic partnerships, dissemination of research activities; enhancement and implementation of laboratories and research institutions, better exploitation of research results, development innovative entrepreneurial opportunities to attract and motivating good researchers in addition to the financial impact. Further positive effects

can be identified in term of increase of human resources mobility between research organizations and enterprises. These benefits include new products on the market, new work opportunities and a more effective and profitable education. This phenomenon is evaluated by various trends as the increase of patents propensity by universities (Nelson 2001), growing university revenues from licensing (Thursby et al. 2001), increasing numbers of university researchers engaging in academic entrepreneurship (Shane 2005), a growing share of industry funding in university income (Hall 2004), and the diffusion of technology transfer offices, industry collaboration support offices and science parks (Siegel et al. 2003).

On this framework, this work primary analyses the diverse nature of university-industry link on the basis of Perkmann & Walsh (2007) results, concerning the source of innovation linked to the University-industry. Hence, the authors try to design a new framework of university – industry link connected to the Nonaka (1994,2009) splitting between tacit and explicit sources of knowledge.

Secondarily, this work analyzes the TIGs as an innovative and effective strategy to disseminate innovative knowledge and know-how and to support the creation and exploitation of innovations linked to the university-industry link. The TIGs are co-operative clusters to develop and disseminate R&D activities and best-practices promoted by Italian Minister of University and Research (MIUR) and built in informal way by universities research organizations, enterprises but also researchers and scholars. Each TIG performs on the basis of a specific area of interest, and in respect of a geographical proximity. The TIGs have been created under the “Information and Publicity Action” within “Multiregional Operational Program for Research, Technological Development and High Education 1994-1999”, managed by the MIUR in collaboration with APRE (Agency for the Promotion of European Research), and developed and acted since 2000 within “National Operational Program on Scientific Research, Technological Development and Higher Training 2000-2006” (NOP Research 2000-2006) for Objective 1 Regions (Campania, Basilicata, Puglia, Calabria, Sicily, Sardinia). The GIT is an initiative of territorial animation and communication designed in order to test a bottom-up approach in the acquisition and sharing of knowledge and information in the field of scientific research and innovation in underdeveloped territories. The ultimate goal is to expand and increase the participation of socio-economic and agents of local development of Community policies, and in particular to NOP Research.

2. Background

Nowadays the academic community started emphasizing that the firms should be open to outside innovation (Rigby and Zook, 2002; Christensen et al., 2005) and to the open collaboration among various actors into innovation value chain.

In this new framework the external sources of innovation become mainly relevant. Rather than relying on internal R&D, organizations are reported to increasingly engage in ‘open innovation’ (Chesbrough 2006). This means that innovation can be regarded as resulting from distributed inter-organizational networks, rather than from single firms (Coombs et al. 2003; Powell et al. 1996). The relevance of inter-organizational and social networks for innovation related processes depend by the nature of knowledge creation as a socially embedded process (Brown and Duguid 1991; Malmberg & Maskell 2002). In the same orientation, various concepts of ‘interactive’ innovation have been put forward to understand the non-linear, iterative and multi-agent character of innovation processes (Kline 1985; Lundvall 1988; von Hippel 1987).

Saint-Paul (2003) describes this networking imperative sustaining that “in an industry with 10 firms similar in output and investment in R&D, each member of a nine-firm technology network can expect to obtain immediate access to nine times the number of innovations that the remaining enterprise can anticipate on the average”. Recent studies have analysed the multifaceted nature of university–industry links (Agrawal 2001; Bonaccorsi and Piccaluga 1994; Grossman et al. 2001), identifying various ‘channels’ (Cohen et al. 2002; D’Este and Patel forthcoming; Faulkner 1994) or ‘mechanisms’ (Meyer-Krahmer and Schmoch 1998) that function as informational or social pathways through which information, knowledge and other resources are exchanged or co-produced across universities and industry. Specially Cohen et al. (2002) distinguish between the following channels relevant to industrial innovation: patents, informal information exchange, publications and reports, public meetings and conferences, recently hired graduates, licenses, joint or co-operative research ventures, contract research, consulting, and temporary personnel exchanges. Scharinger et al. (2002) identify 16 types of ‘knowledge interaction’ grouped into four categories: joint research (including joint publishing), contract research (including consulting, financing of university research assistants by firms), mobility (staff movement between universities and firms, joint supervision of students) and training (co-operation in education, training of firm staff at universities, lecturing by industry staff).

Therefore, in open innovation contexts the framework change and innovation process depends increasingly by the knowledge sharing among organizations and/or networks and by the linked capabilities of such organizations to manage knowledge for producing innovative knowledge. Enkel, Gassmann and Chesbrough (2009) identify three core processes that may be differentiate in open innovation:

The outside-in process: enriching the company’s own knowledge base through the integration of suppliers, customers, and external knowledge sourcing. This process can increase a company’s innovativeness (Laursen and Salter, 2006; Lettl et al., 2006; Piller and Walcher, 2006).

The inside-out process refers to earning profits by bringing ideas to market, selling IP, and multiplying technology by transferring ideas to the outside

environment. Companies that establish the inside-out process as key, focus on externalizing their knowledge and innovation in order to bring ideas to market faster than they could through internal development.

The coupled process refers to co-creation with complementary partners through alliances, cooperation, and joint ventures during which give and take are crucial for success. Companies that establish the coupled process as key combine the outside-in process (to gain external knowledge) with the inside-out process (to bring ideas to market).

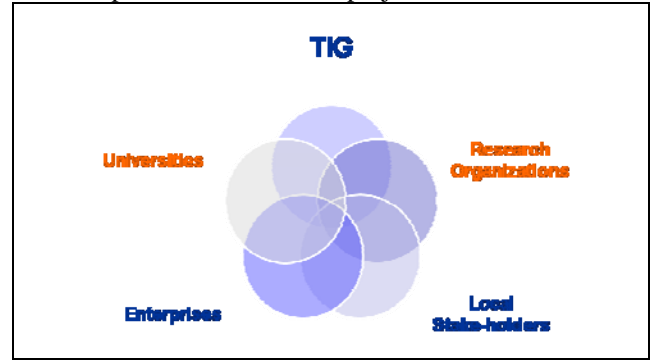
On this basis, this work focuses on the open innovation process as coupled process (3), analyzing the strategy of creating, exploiting and disseminating innovation followed-up by the cluster of Territorial Interest Groups (TIGs).

3. The GITs Strategy

The consensus and the interest found in the territory for the initiative, has already led to the GIT in 2001 to become an integral part of the communication plan of the NOP Research 2000-2006.

The aim of the GITs network is to expand and strengthen the participation of stakeholders in local development by creating a more favourable condition to the exchange of experiences and best practices and strengthening the weak links of communication processes, horizontal and vertical, in the territorial areas Objective 1. The following Figure 1 evidences the diverse actors involved in the process of creating and transferring innovation inside the TIG. Each TIG supports the Clusters of Innovation (COIs) are environments that encourage the creation and development of high potential entrepreneurial ventures. COIs are characterized by heightened mobility of resources (principally people, capital, and information -including intellectual property); increased velocity of business development; and a culture of mobility that leads to an affinity for collaboration, development of durable relationships, and the formation of Networks of Clusters of Innovation. The concept of business clusters has been largely studied by Becattini (1989) and Porter (1990) that have defined it as a geographic concentration of a critical mass of interconnected companies and institutions in a particular field. Firms in a cluster gain many performance advantages (Doeringer & Terkla, 1995) due to the external economies of scale (Fujita, Krugman, & Venables, 2000; Krugman, 1991); eased access to information; proximity to specialized suppliers and customers; and reduced transaction costs, among others (Porter, 1998, 2000). In a cluster, firms have free access to local information and networks throughout their physical proximity (Gertler, 1995, 2003). However, this geographical agglomeration of businesses by industry does not totally explain the ability of specific regions to support the continuous emergence of high growth startup companies almost independently of industry alignment. In

animation and dissemination of the NOP actions at local level and encourages local governments and institutions to develop innovative research projects.



Source: Author Design.

Figure 1 : Knowledge Transfer model within the TIGs.

This open strategy favours the involving of diverse categories of subjects within the innovation process through a bottom up approach that supports the development of clusters of innovation (COIs). In this new framework the external sources of innovation become mainly relevant. Rather than relying on internal R&D, organizations are reported to increasingly engage in 'open innovation' (Chesbrough 2006). This means that innovation can be regarded as resulting from distributed inter-organizational networks, rather than from single firms (Coombs et al. 2003; Powell et al. 1996). The relevance of inter-organizational and social networks for innovation related processes depend by the nature of knowledge creation as a socially embedded process (Brown and Duguid 1991; Malmberg & Maskell 2002).

such regions it is not the industry specialisation that incentive the business development but the ability to accelerate the process to produce innovation by an effective valorization of knowledge, competencies and human resources operating for innovation. Thus, in COIs the main advantage is not defined by industry specialization, but by the stage of development and innovation.

COIs are characterized by mobile assets (i.e. money, people, and information, including know-how and intellectual property) which "facilitate rapid innovation utilizing new venture formation, experimentation, scaling and, if necessary, failure" (Freeman & Engel, 2007). Entrepreneurship is the core competence of COIs, where innovation is augmented and accelerated through new firm creation, and urgency demanded by competition and limited resources.

According to Wonglimpiyarat (2006) COIs are important mechanisms catalyzing the economic development at Silicon Valley. In effect, Silicon Valley has benefited greatly from the effective use of university resources, VC and a large pool of scientists, engineers, and skilled technicians. In this "incubator region" (such as silicon Valley, California) the supporting infrastructure of professional service providers is well versed in the needs of startups and small technology companies (Saxenian, 2006). Most of the established firms of Silicon Valley (e.g., Hewlett Packard, Intel, Apple, Cisco,

Google, Genentech, eBay, Sun Microsystems, ALZA) have emerged from relatively recent entrepreneurial beginnings.

The following figure shows the various stages of development of US Silicon Valley and the existent relationship among the multiple actors that have supported the large development of such COI. Thus, Silicon Valley innovation ecosystem currently represents the most advanced experience of university-industry link all over the world: advanced laboratories, business incubators, venture capitals and business angels jointly to researchers, technicians, managers and consultants are the body and the soul of this success.

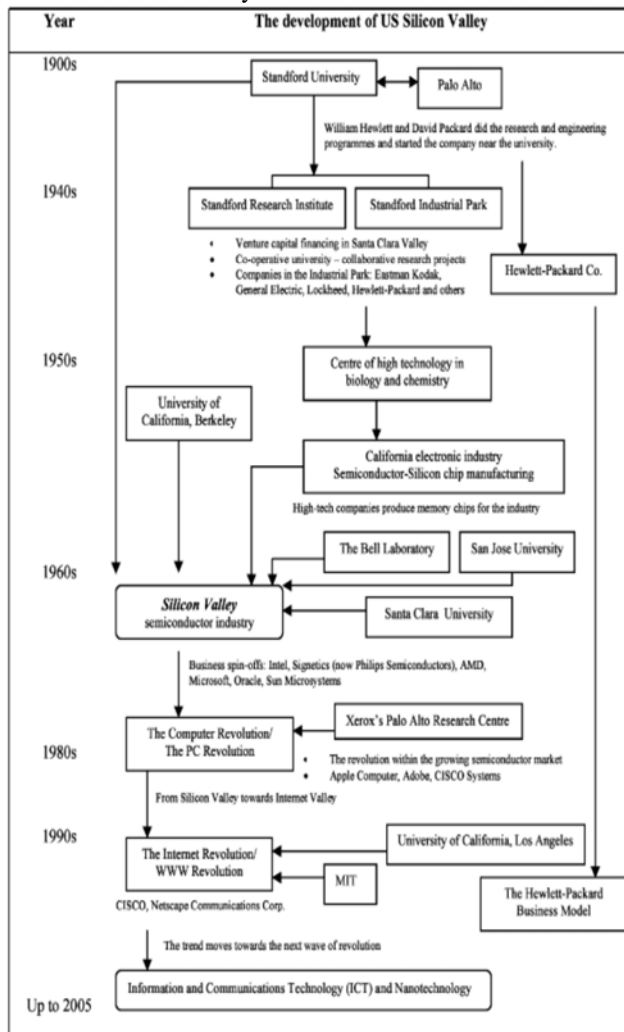


Figure 2.2 The development of US Silicon Valley. Source: Wonglimpiyarat (2006)

This culture of innovation and new venture development, based on mobility of resources, gives rise to business practices whereby mobile asset frequently cross regional boundaries in order to foster international collaborations far earlier in the venture development cycle than the historical norm.

Currently, new industry clusters have emerged in different regions around the world, and a network of formal and informal collaborations among their entrepreneurial firms has been created. This multidimensional web of interrelationships includes weak ties, durable bonds, and covalent bonds, and constitutes the global Network of

Clusters of Innovation (NCOI). In a COIs the entrepreneurial process is a mechanism for continuous and rapid innovation, technology commercialization, business model experimentation, and new market development, and the process is encouraged by a dense venture capital cluster and the related facility for the creation of well structured, funded, and connected startups. Startups benefit from being co-located with other companies, suppliers, and service providers specialized in or compatible with entrepreneurship.

Globalization facilitated the circulation of people, money, and technology from abroad, and contributed to Silicon Valley's success (Saxenian, 1994). It also has been a potent force in fostering born global startups. International mobility of people facilitated immigration of talented engineers, scientists, managers, entrepreneurs, and other professionals from all over the world; today, most companies consist of a multicultural workforce. The mix of cultures requires additional efforts toward integration and understanding, and management of linguistic and cultural differences (Saxenian, 2006). Multicultural and open-minded workforces offer competitive advantages to companies. Diversity imparts excitement, energy, and creativity, which are transformed into continuous innovation (Florida, 2002). Professional entrepreneurs (Freeman & Engel, 2007), investors, and employees from various countries and industries can interact with each other and form new networks of people, from the same or divergent industries, cultures, languages, and identities.. Additionally, the power of diverse shared identities eases collaboration with research centers, customers, and other organizations located in their countries of origin (Castells, 1997).

8. Conclusions

As we have seen, technology sourcing from external suppliers is a major strategic competitive challenge. It rules according to intensive collaboration between the partners. If the machine-tool supplier does not meet his customer's expectations, he can be replaced very easily. This is largely due to the strong fragmentation in the machine-tool industry, in which the many small companies try to satisfy the needs of mostly very large industrial companies. Therefore, the customer feels no urge to include the machine-tool supplier in his own technology strategy development. For instance, although they are very well-known for their strategic partnerships with suppliers, most car producers do not have such strategic partnerships with their machine-tool suppliers. They tend to rely on the market forces, i.e., rather than educate their supplier which the principal disadvantages of strong supplier integration

9. References

- Acs Z., Varga A. (2005) Entrepreneurship, Agglomeration, and Technological Change. *Small Business Economics* 24:323–334.
- Auerswald P. E., Kauffman S., Lobo J., Shell K. (2000) The Production Recipes Approach to Modeling Technological Innovation: An Application to Learning by Doing. *Journal of Economic Dynamics and Control* 24:389–450.
- Chesbrough, H.W. (2006). Open innovation: a new paradigm for understanding industrial innovation.
- Chesbrough, H. W., Appleyard M. (2007), Open Innovation and Strategy, *California Management Review*, 50, 1.
- Cohen, W.M., Nelson, R.R. and Walsh, J.P. (2002). Links and impacts: the influence of public research on industrial R&D. *Management Science*, 48(1), 1–23.
- Coombs, R., Harvey, M. and Tether, B.S. (2003). Analysing distributed processes of provision and innovation. *Industrial & Corporate Change*, 12, 1125–1155.
- Cox D, Gagliardi D. (2009) The Public Private R&D Nexus of R&D, IPTS Working Paper on Corporate R&D And Innovation 06/2009, Joint Research Centre, Institute For Prospective Technological Studies, Office For Official Publications Of The European Communities.
- Damianova C.D., Z. M. Nikos Z. M. (2009) Contribution of policies at the regional level to the realisation of the European Research Area Prepared by ERAWATCH NETWORK.
- Degroof, J., Roberts, E. B. (2004), Overcoming weak entrepreneurial infrastructures for academic spinoff ventures, *Journal of Technology Transfer*, 29, 3–4, 327–354.
- Dewett, T., Jones, G.R. (2001), The role of information technology in the organization: a review, model, and assessment *Journal of Management*, 27, 313–34.
- Dodgson, M. (1993), *Technological Collaboration in Industry*, London: Routledge.
- EBAN Network Activities report, 2007. Experiences on the US knowledge transfer and innovation system.
- Engel J. S., Del Palacio I. (2009), Global networks of clusters of innovation: Accelerating the innovation process *Business Horizons* 52, 493.
- Enkel E., Gassmann O. and Chesbrough H. (2009), Open R&D and open innovation: exploring the phenomenon *R&D Management* 39, 4.
- European Commission (2007), “Improving knowledge transfer between research institutions and industry across Europe: embracing open innovation”, COM (2007) 182 final.
- European Commission (2006), Putting knowledge into practice: A broad-based innovation strategy for the EU, COM (2006) 502.
- Fleming, L., O. Sorenson (2001), Technology as a complex adaptive system: Evidence from patent data. *Res. Policy*, 30, 1019–1039.
- Freeman, J., & Engel, J. (2007). Models of innovation: Startups and mature corporations. *California Management Review*, 50, 1, 94–119.
- Freeman, C. (1995), The national system of innovation in historical perspective, *Cambridge Journal of Economics*, 19, 5-24.
- Gulati, R. (1998), Alliances and networks. *Strateg. Manage. J.* 19, 293–317 (special issue).
- Gulati, R. (1999), Network location and learning: the influence of network resource and firm capabilities on alliances formation. *Strateg. Manage. J.* 20, 397–420.
- Grant, R. (1996), Toward a knowledge-based theory of the firm., *Strateg. Ma age. J.* Winter special issue, 109–122.
- Jones, G. R., Dewett, T. (2001), The role of information technology in the organization: a review, model, and assessment, *Journal of Management*, 27, 313–346.
- Jonnansen, J. A., Olsen, B., Olaisen, J. (1999), Aspects of innovation theory based on knowledge-management, *International Journal of Information Management*, 19, 121-139.
- Hagel, J., Singer, M. (1999) *Net Worth* Harvard Business School Press, Boston.
- Hall, B.H. (2004). University–industry partnerships in the United States. In Contzen, J.-P., Gibson, D. and Heitor, M.V. (eds), *Rethinking Science Systems and Innovation Policies*. Proceedings of the 6th International Conference on Technology Policy and Innovation. Ashland, OH: Purdue University Press
- Hannan, M., Freeman, J. (1984) Structural inertia and organizational change. *Am. J. Sociol.* 49, 149–164.
- Hannan, M., Carroll, G. (1992), *Dynamics of Organizational Populations: Density, Legitimation and Competition*, Oxford Univ. Press, New York. 740 S.J. Chang, *Journal of Business Venturing* 19, 721–741
- Kallinikos, J. (2006), The consequences of information: institutional implications of technological change Edward Elgar, Cheltenham, IX, 205.
- Landstrom, H. (1991), The value-adding effect of cooperation between venture capitalists and small firms. Proceedings of the 36th ICSB World Conference (1):30-38.
- Leavy, (1998), The concept of learning in the strategy field, review and outlook, *Management Learning*, 29, 4, 447–466.
- Leyersdorff – Etkowitz (1998), A Triple Helix of University – Industry – Government Relations”
- Levinthal, D.A., (1997), Adaptation on rugged landscapes. *Manag. Science*, 43, 7, 934–940.
- Liebeskind, J. (1996), Knowledge, strategy, and the theory of the firm. *Strateg. Manage. J.* Winter issue, 93–107.
- Lockett, A., Wright M., Franklin, S. (2003), “Technology transfer and universities’ spinout strategies”, *Small Business Economics*, 20, 185-200.
- Meyer-Krahmer, F. and Schmoch, U. (1998). Sciencebased technologies: university–industry interactions in four fields. *Research Policy*, 27, 835–851.
- Nelson, R.R. (2001). Observations on the post-Bayh– Dole rise of patenting at American universities. *Journal of Technology Transfer*, 26(1–2), 13–19.
- Nonaka I. (1994), A Dynamic Theory of Organizational Knowledge Creation, *Organization Science*, 5, 1, 14-37.
- Nonaka, I., Von Krogh, G., (2009) Tacit Knowledge and Knowledge Conversion: Controversy and Advancement in Organizational Knowledge Creation Theory, *Organization Science*, 20, 3, 635–652.
- Perkmann M. and Walsh K. University–industry relationships and open innovation: Towards a research agenda *International Journal of Management Reviews* (2007)
- Powell, W.W., Koput, K.W. and Smith-Doerr, L. (1996). Interorganizational collaboration and the locus of innovation: networks of learning in biotechnology. *Administrative Science Quarterly*, 41(1), 116.
- Powell, W.W. and Grodal, S. (2005). Networks of innovators. In Fagerberg, J., Mowery, D., and Nelson, R. (eds), *Oxford Handbook of Innovation*. Oxford: Oxford University Press.
- Proton Europe (2006), ProTon Europe, Fourth Annual Survey Report.
- Sapienza H. J., Parhankanga A., Erkko A. (2004), Knowledge relatedness and post-spin-off growth, *Journal of Business Venturing* 19, 809–829.
- Shane, S.A. (2005). *Economic Development Through Entrepreneurship: Government, University and Business Linkages*. Cheltenham: Edward Elgar.
- Schartinger, D., Rammer, C., Fischer, M.M. and Fröhlich, J. (2002). Knowledge interactions between universities and industry in Austria: sectoral patterns and determinants. *Research Policy*, 31, 303–328.

- Siegel, D.S., Waldman, D. and Link, A. (2003). Assessing the impact of organizational practices on the relative productivity of university technology transfer offices: an exploratory study. *Research Policy*, 32, 27–48.
- Siegel, D.S., Waldman, D. and Link, A. (2003), Assessing the impact of organizational practices on the relative productivity of university technology transfer offices: an exploratory study. *Research Policy*, 32, 27–48.
- Thursby, J.G.A., Jensen, R.A. and Thursby, M.C.A. (2001). Objectives, characteristics and outcomes of university licensing: a survey of major us universities. *Journal of Technology Transfer*, 26(1), 59–72
- Vohora A., Wright M., Lockett A. (2004), “Critical junctures in the growth in university high-tech spinout companies”, *Research Policy*, 33,147-175.
- Von Hippel, E. (1987). *The Sources of Innovation*. New York: Oxford University Press.